US Army Corps of Engineers ®
Albuquerque District

Evaluating the effects of Alternatives:

Plan Formulation and Evaluation Challenges Surrounding Appurtenant Features in a "Simple" Flood Damage Reduction Study

Robert L. Browning II
Regional Economist
CESPA-PM-LP

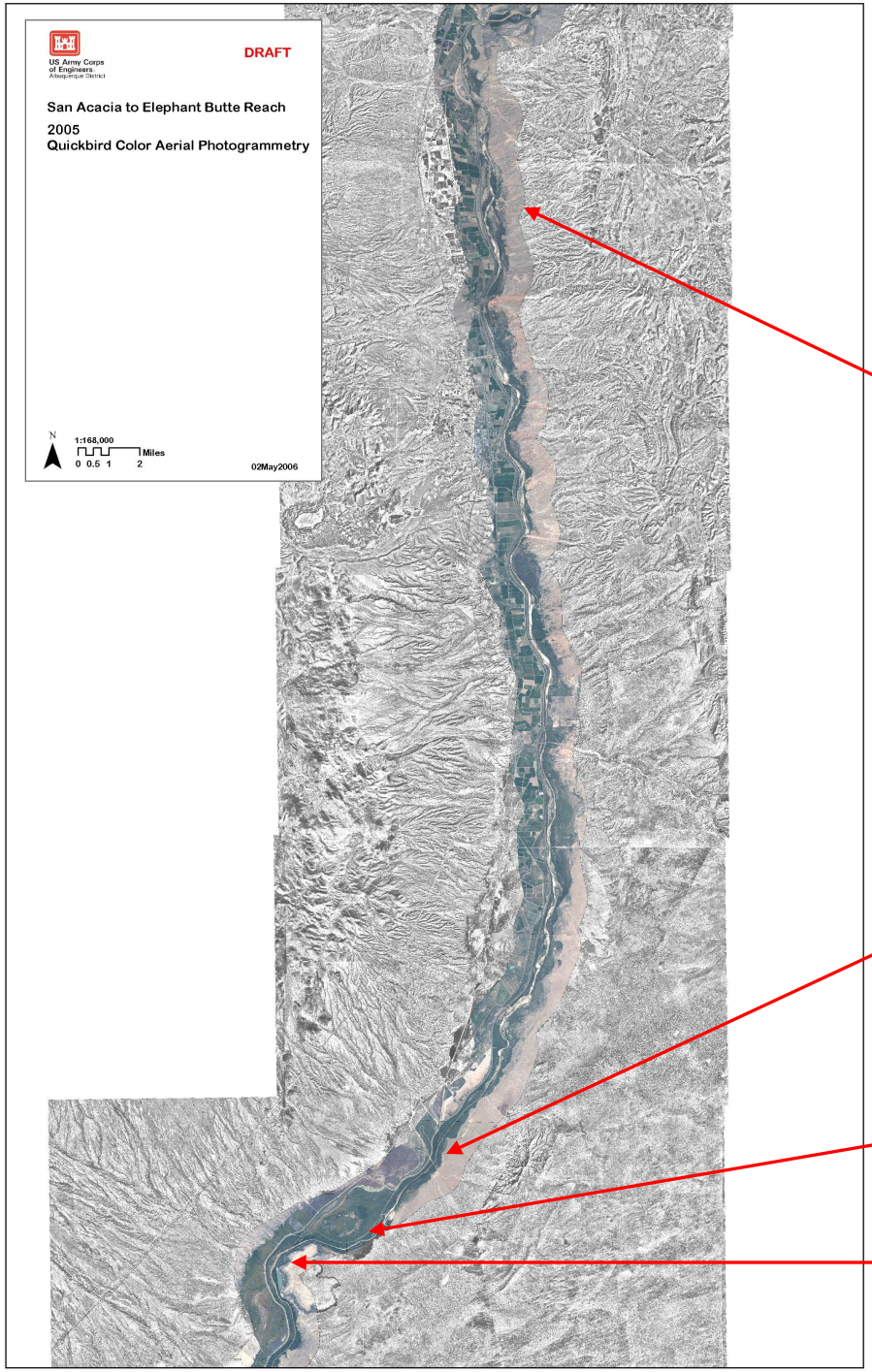
US Army Corps of Engineers ®
Albuquerque District

Summary

- Early efforts: provide flood damage reduction to public and private properties on the west bank of the Rio Grande.
  - Significant benefits attributable to Bureau of Reclamation's Low Flow Conveyance Channel.
- Study developments (*"Crescit Eundo"*):
  - San Marcial Railroad Bridge
  - Tiffany Basin
- Identifying the recommended plan.

US Army Corps of Engineers ®
Albuquerque District

Study Area



Approx. 45 river miles

BoR LFCC along west bank

Town of Socorro

Bosque Del Apache NWR

Tiffany Area

San Marcial RR Bridge

US Army Corps of Engineers ®
Albuquerque District

The Analysis

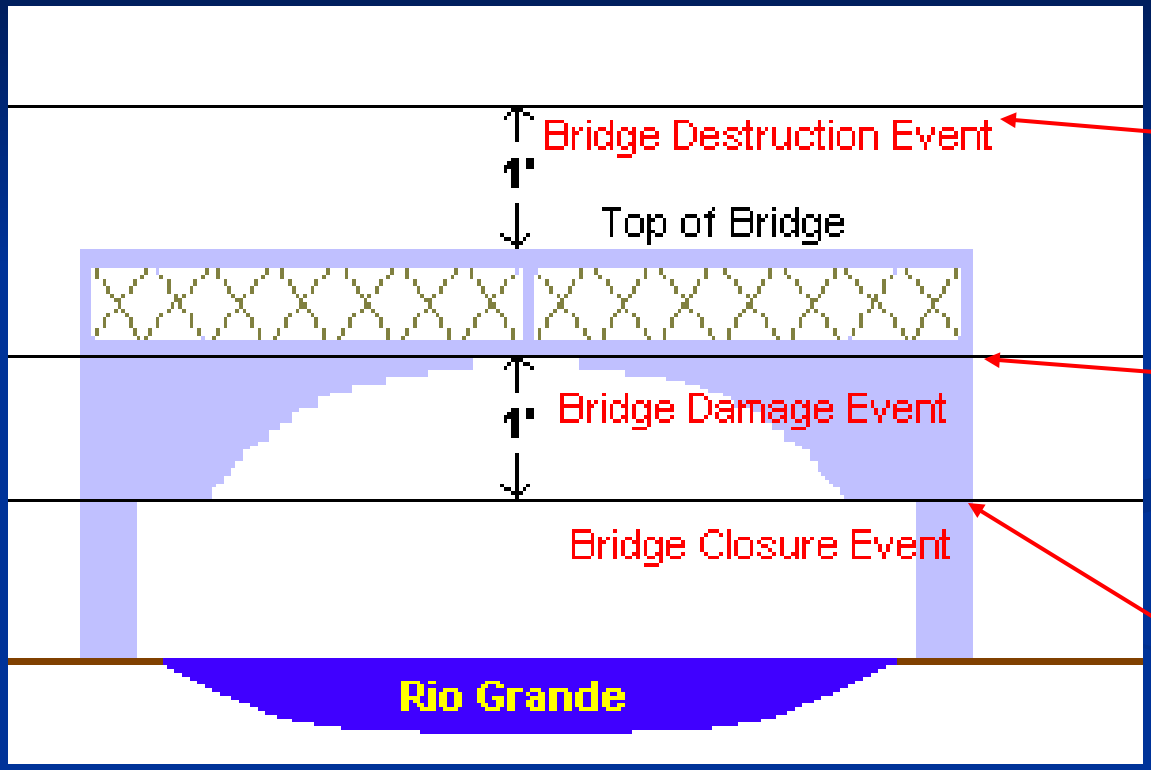
- Levees along West bank of Rio Grande
  - 5 levee heights considered
  - Sedimentation along southern portions of study area will erode project performance in the future
  - Is there induced flooding to properties on East bank? Downstream?
  - Does NED plan identification change with inclusion of other features?
- Replacement RR Bridge at San Marcial, NM
  - How much time is left?
  - Does a levee upstream impact bridge performance?
- Tiffany Sediment Basin
  - Does this feature mitigate project performance upstream?
  - Does this feature improve RR Bridge performance?

US Army Corps of Engineers ®
Albuquerque District

San Marcial RR Bridge

US Army Corps of Engineers ®
Albuquerque District

Evaluating effects of Alternatives



1 year closure to replace bridge w/ new design

30 day closure to repair bridge

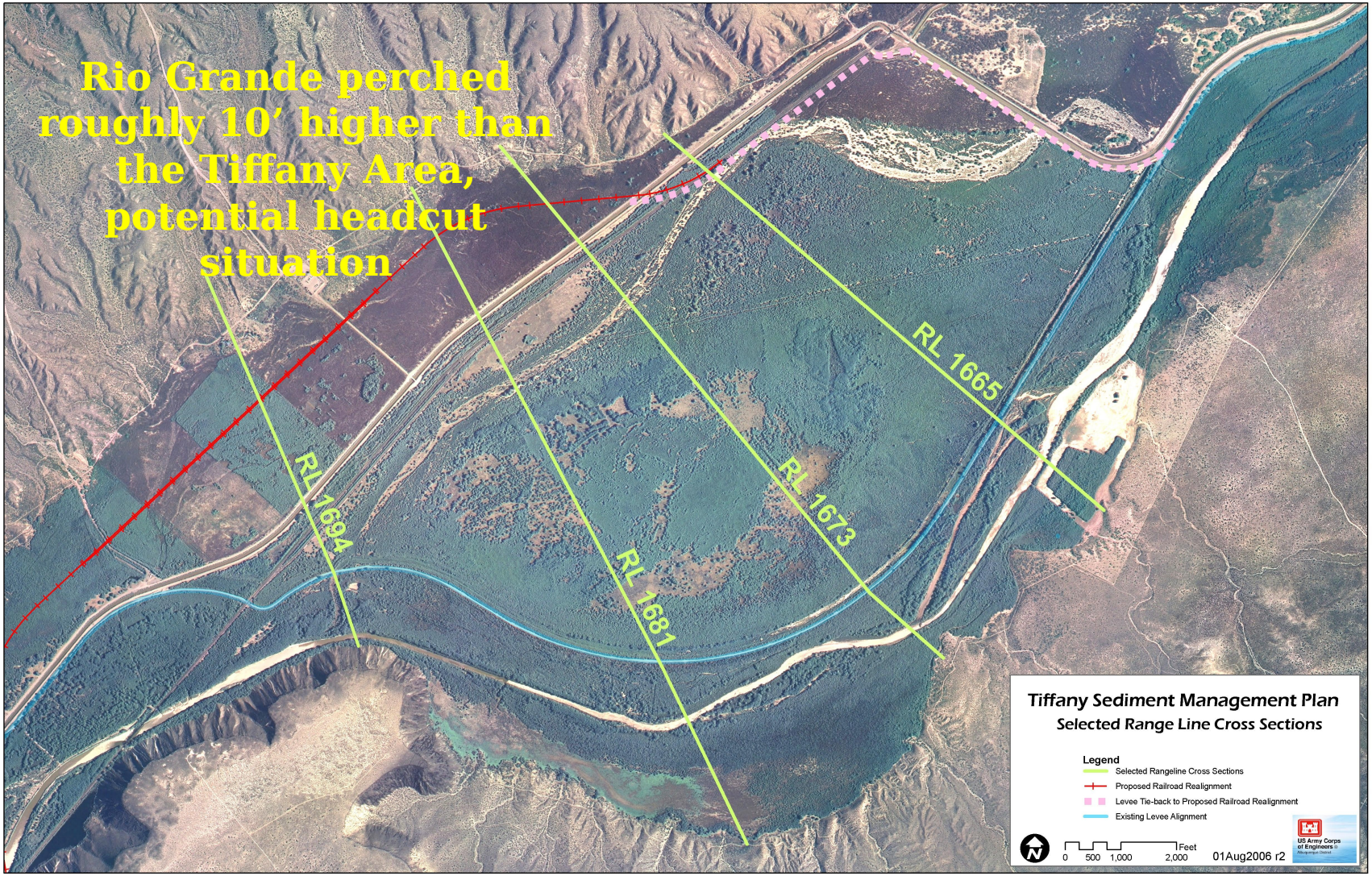
36 hour closure to monitor water levels

Bridge flooding consequences

- Physical damage to structure
- Traffic reroutes (30,000 tons/day, 105 mi. reroute)
- Increased blockage of Rio Grande

US Army Corps of Engineers ®
Albuquerque District

"Tiffany Sediment Basin"



US Army Corps of Engineers ®
Albuquerque District

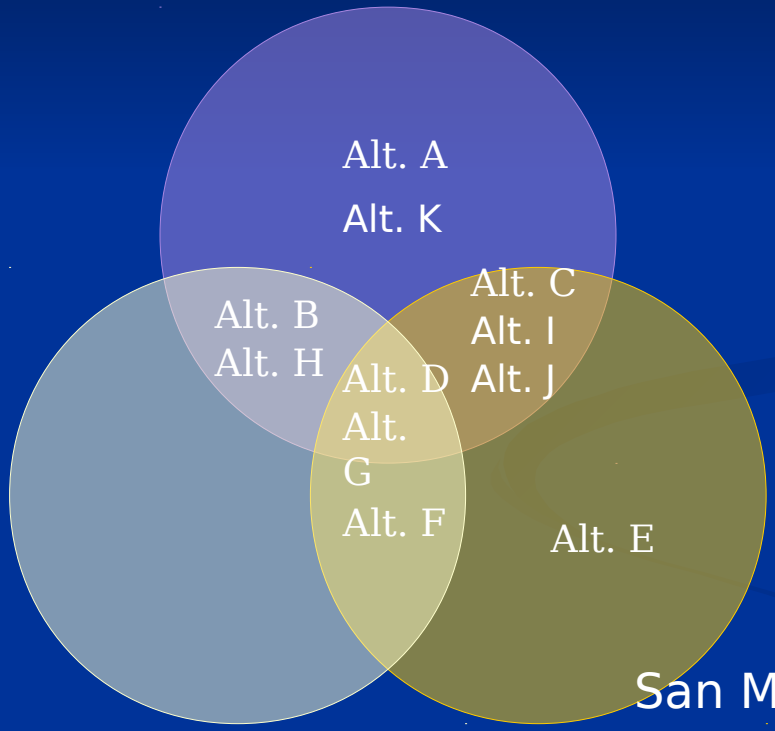
Combining features to form plans (Why planners make the big bucks)

- Alternative A – Levee only (5 sizes considered here and in all Alts.)
- Alternative B – Alt. A Levee + Tiffany
- Alternative C – Alt. A Levee + RR Bridge
- Alternative D – Alt. A Levee + Tiffany + RR Bridge
- Alternative E – RR Bridge
- Alternative F – Tiffany + RR Bridge
- Alternative G – Alt. A Levee (new alignment along Tiffany) + Tiffany + RR Bridge
- Alternative H – Alt. A Levee (new alignment along Tiffany) + Tiffany
- Alternative I – Alt. A Levee (new alignment along Tiffany) + RR Bridge
- Alternative J – Alt. A Levee (2nd new alignment along Tiffany) + RR Bridge
- Alternative K – Alt. A Levee (2nd new alignment along Tiffany) +

US Army Corps of Engineers ®
Albuquerque District

Combining features to form plans

Levee upstream

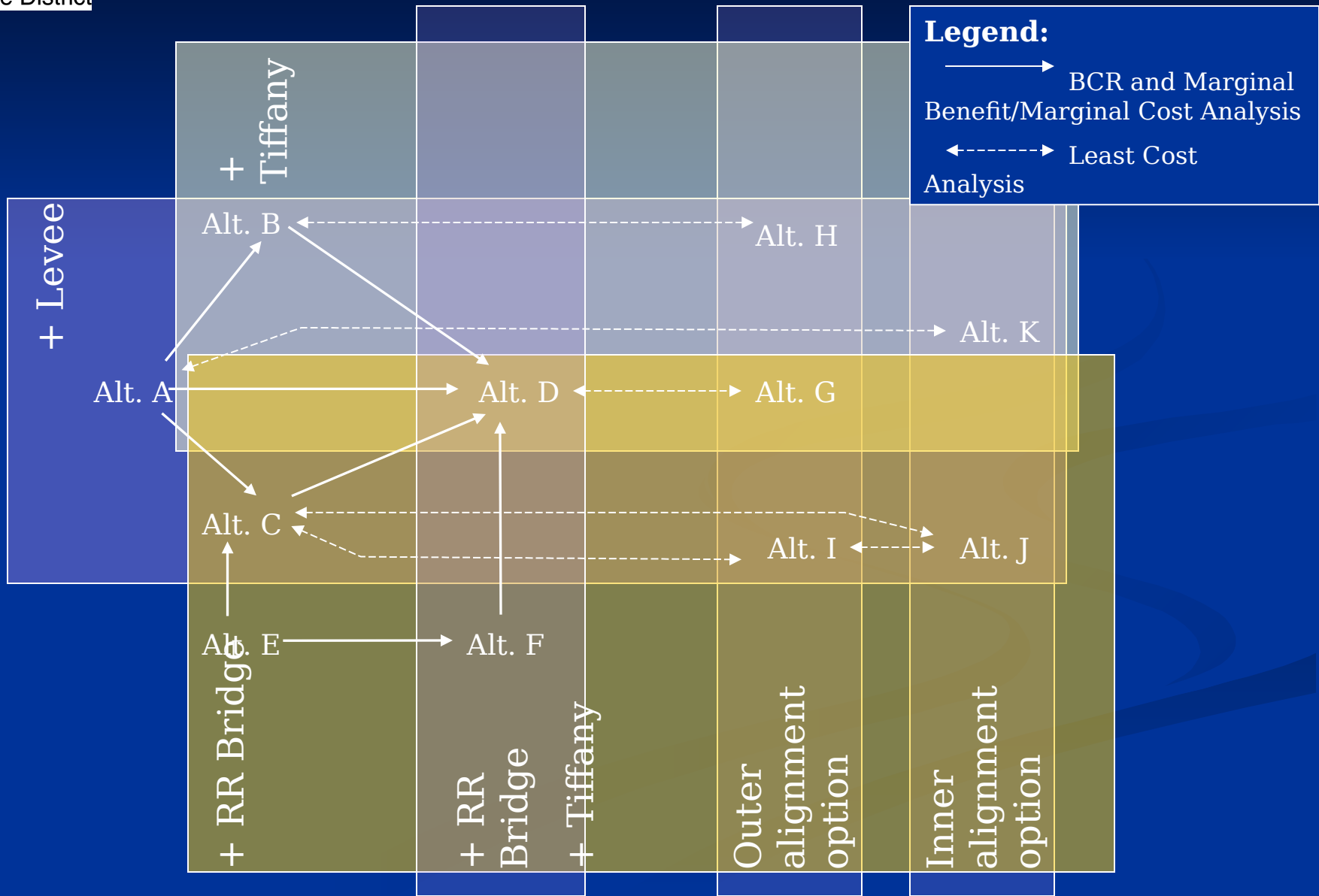


Tiffany Basin

San Marcial railroad bridge

US Army Corps of Engineers ®
Albuquerque District

Evaluating Alternatives



US Army Corps of Engineers ®
Albuquerque District

Findings

- Levee
  - NED plan is the largest of the five levees considered.
  - Extra features do not affect levee height selection
  - Alternative alignments to incorporate extra features were more expensive.
- RR Bridge
  - No hydraulic impact between proposed project upstream and RR Bridge
  - Justified on BCR basis, but not authorized.
- Tiffany Sediment Basin
  - Some benefit in mitigating future sedimentation upstream, but not enough to justify including the feature in flood damage reduction project.

US Army Corps of Engineers ®
Albuquerque District

Key Takeaway Points

- Write up the “outlier” plans, even ones that were tossed early.
  - “Rolls Royce” RR Bridge alignment.
  - Bigger levees.
- Analysis settles questions, supposition, and gut feelings.
  - Tiffany thought to do more than it did.
  - Levees upstream thought to impact RR Bridge sufficient to justify a taking.
- Use the documents to describe what you did and why.
  - This project has been evaluated for roughly 40 years!
  - Very difficult to determine how we got here from there in meeting minutes.

US Army Corps of Engineers ®
Albuquerque District

And finally...

Crescit Eundo = It Grows as it Goes

(Lucretius - *De Rerum Natura* (*On The Nature of Things*)) (New Mexico State Motto)